CSE101-Lec#1

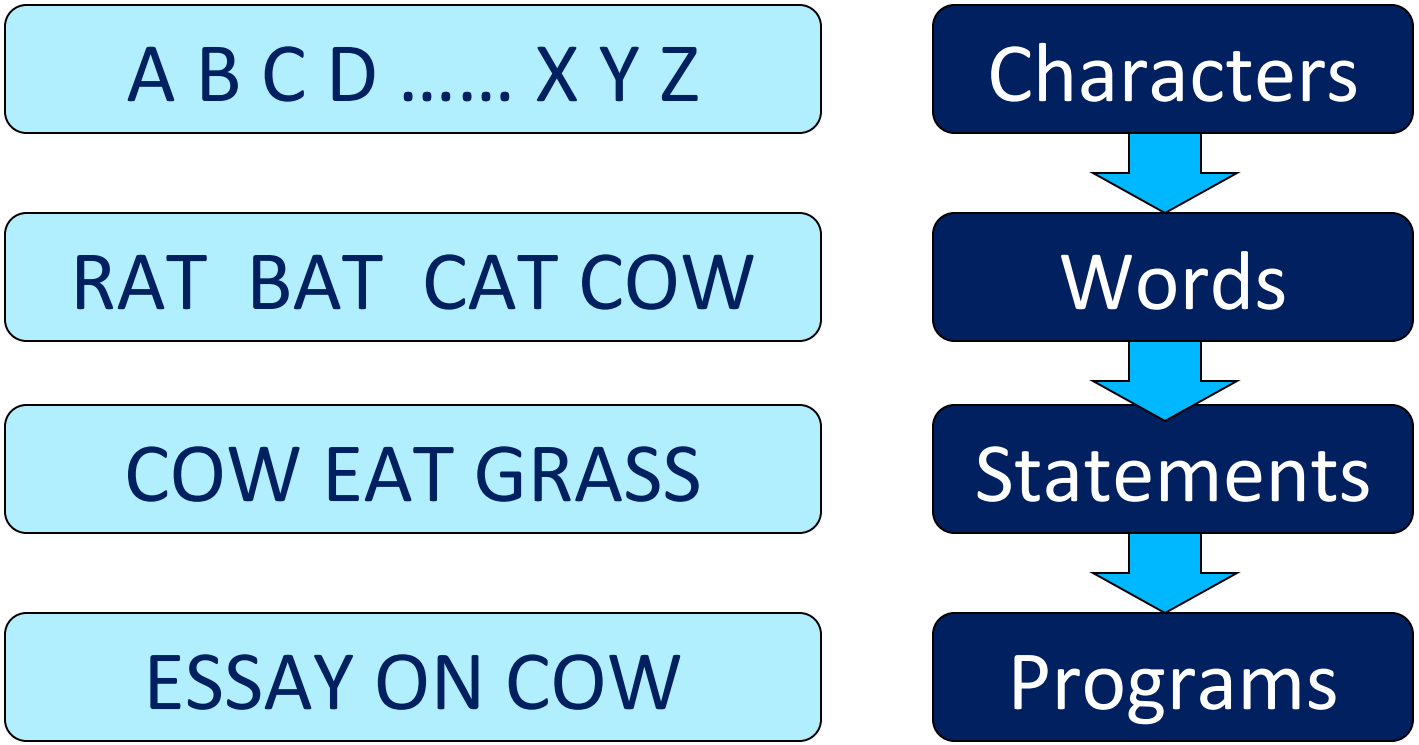
Character Set
Identifiers and Keywords
Data types

OUTLINE

- In this lecture we will cover
  - Character set
  - Identifiers
  - Keyword
  - Data types

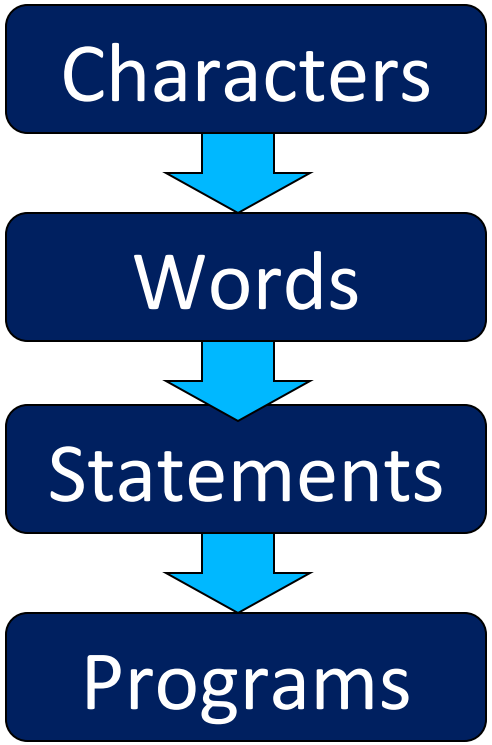
Language: its influence in our life

- Let us look to what we are doing since our childhood, how did we learnt ENGLISH- A recap



Introduction to C

- Like every language C programming language requires basic building blocks to communicate with the computer.
- So we require
  - Character set
  - Words(keywords and identifiers)
  - Statement (instructions)
  - Program



Character Set

- The character set of C represents alphabet, digit or any symbol used to represent information.

Types	Character Set
Uppercase Alphabets	A, B, C, … Y, Z
Lowercase Alphabets	a, b, c, … y, z
Digits	0, 1, 2, 3, … 9
Special Symbols	~ ‘ ! @ # % ^ & * ( ) _ - + = | \ { } [ ] : ; " ' < > , . ? /
White spaces	Single space, tab, new line.

Meaningfulness

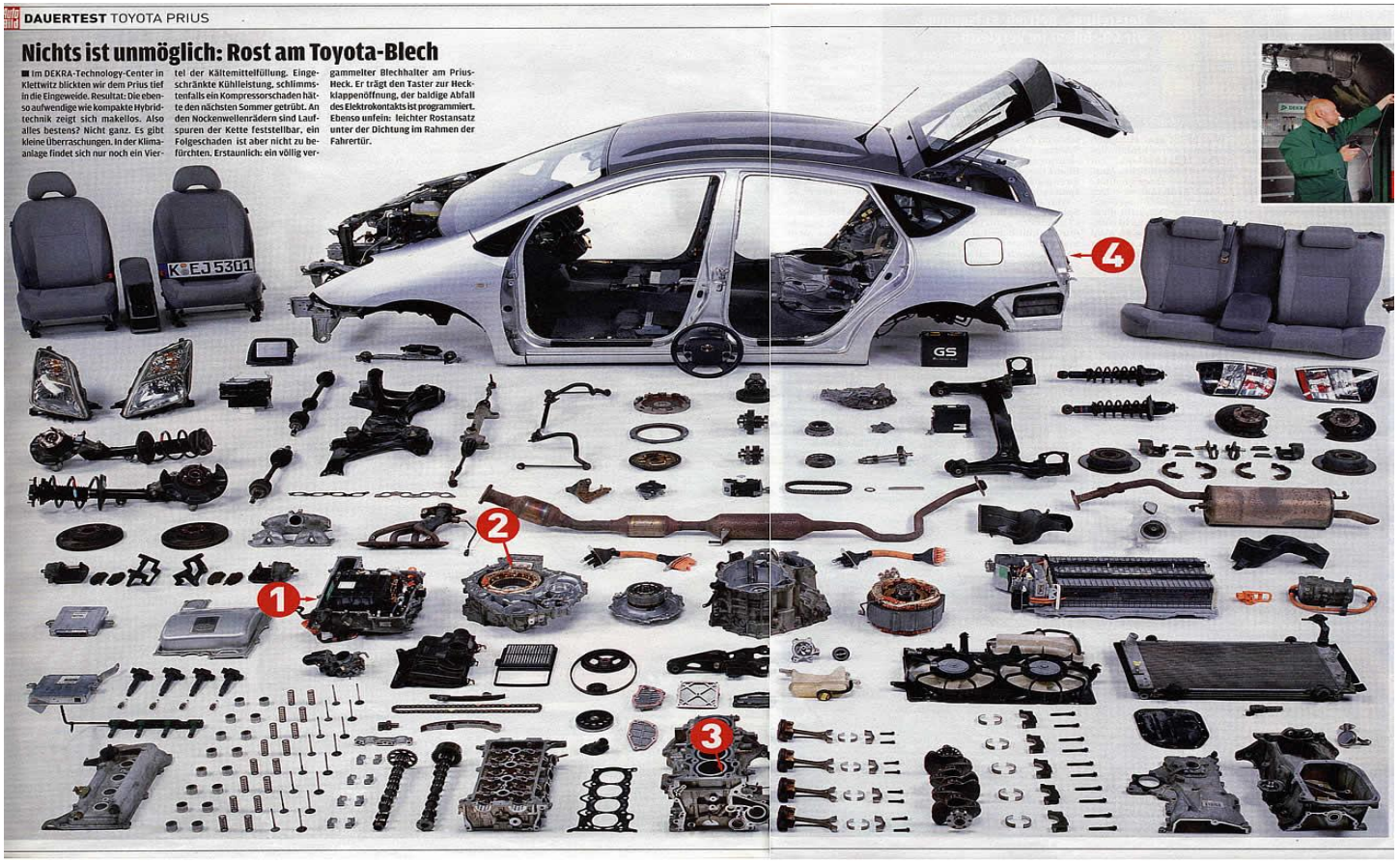
- Let us look to some words
- **saslc, enp, keib, rac, llab**

- Rearrange
- **Class, pen, bike, car, ball**

- This is the influence of adding meaning by logical and sensible grouping in mode of communication through language

Token

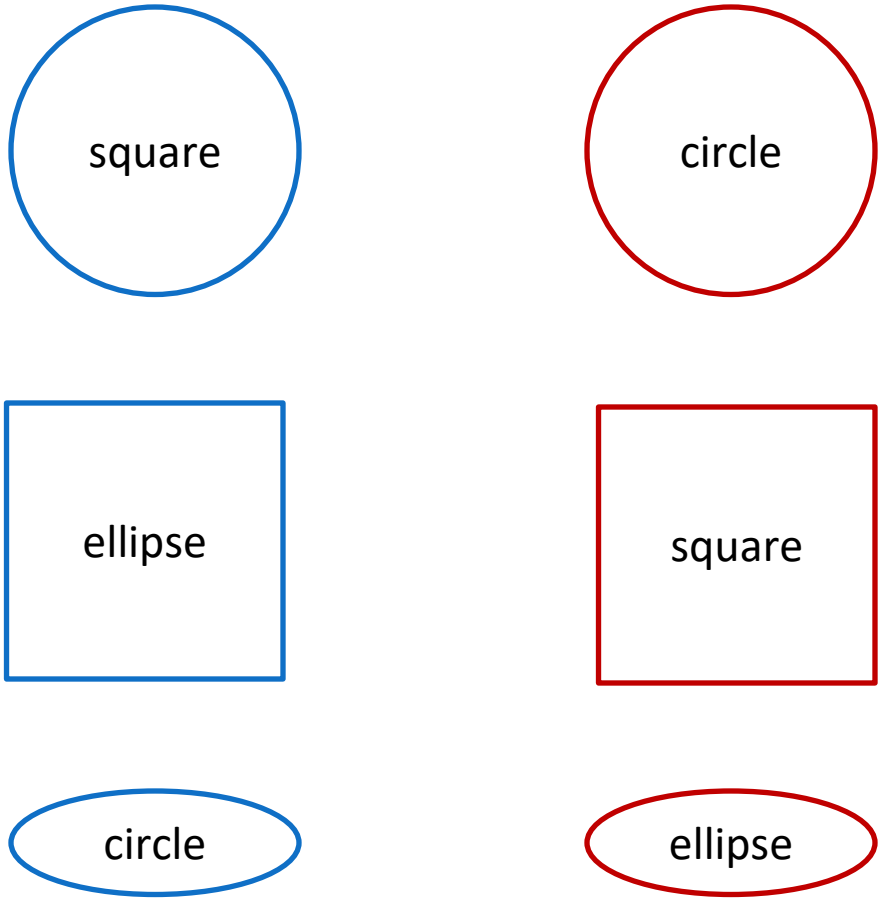
- Every single element in a C Program is Token



Token

- Smallest unit in a program/statement.
- It makes the compiler understand what is written in the program.
- Example: main, printf , name,), etc.
- Tokens are broadly classified as:
  - Identifiers
  - Keywords
  - Constants
  - Variables
  - Strings
  - Operators
  - Special character

Lets Identify the following:



Identifiers

- So to identify things we have some name given to them .
- Identifiers are the fundamental building blocks of a program
- Used to give **names** to variables, functions, constant, and user defined data.
- They are user-defined names and consist of a sequence of letters and digits

Rules for naming an Identifier

1. An identifier name is any combination of 1 to 31 alphabets, digits or underscores.

2. The first character in the identifier name must be an alphabet or underscore.

3. No blanks or special symbol other than an underscore can be used in an identifier name.

4. Keywords are not allowed to be used as identifiers.

Some Identifiers

Tool_spanner;
tool_spanner;

both are different

FORMULA1;

engine_1;

Wrong identifiers name

1_engine;

break;

@car-roof;

C Keywords

- Keywords are the reserved words whose meaning has already been explained to the C compiler.
- We cannot use these keywords as variables.
- Each keyword is meant to perform a specific function in a C program.
- There are 32 keywords in C language.
- All keywords are written in lowercase only

Eg: The **name** of person can never be **home**, **eat**, **sleep**, **run**, etc because these words have some predefined meaning to perform some task.

List of C Keywords

auto	double	int	struct
break	else	long	switch
case	enum	register	typedef
char	extern	return	union
const	float	short	unsigned
continue	for	signed	void
default	goto	sizeof	volatile
do	if	static	while

Which of the following is a valid identifier name?

A. 1abcpqr
B. break
C. abc_pqr
D. ^abc

Which of the following is not a valid identifier?

a) __a3

b) __3a

c) __A3

d) None of the mentioned

Which of the following is not a valid identifier?

a) _a3;

b) a_3;

c) 3_a;

d) _3a;

Data Types

- Data type means the type of value a variable will have.
- It also defines memory space for a particular variable in computer.

- Lets see a mathematics problem:

My-Car

1. If the radius of car wheel is 15inch then what will the distance traveled after one rotation of that wheel?

Sol: Given-

radius = 15 — 15 — Integer(int in C)

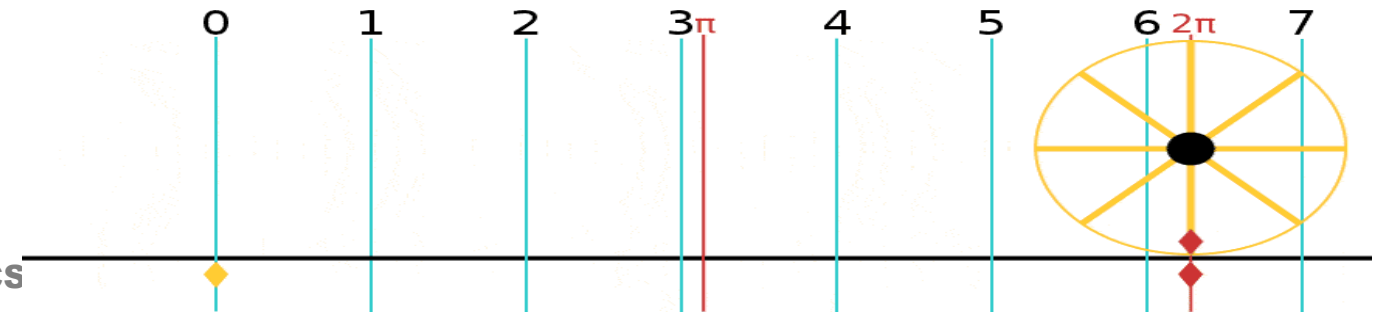
dist_travelled = ?

So, Circumference of circle = 2 * pi * r

dist_travelled = 2 * 3.14 * radius — 3.14 — Real (float in C)

dist_travelled = 6.28 * 15

dist_travelled = 94.2 Ans. — 94.2 — Real (float in C)



My-Grades

2. Five students have appeared for Mathematics exam and their respective marks are

   84,34,97,58,64

consider the rank bands and their respective grades as

80 to 100 – A
60 to 79 – B
40 to 59 – C
less than 40 – D

So find the grade for each students?

Sol: Given-

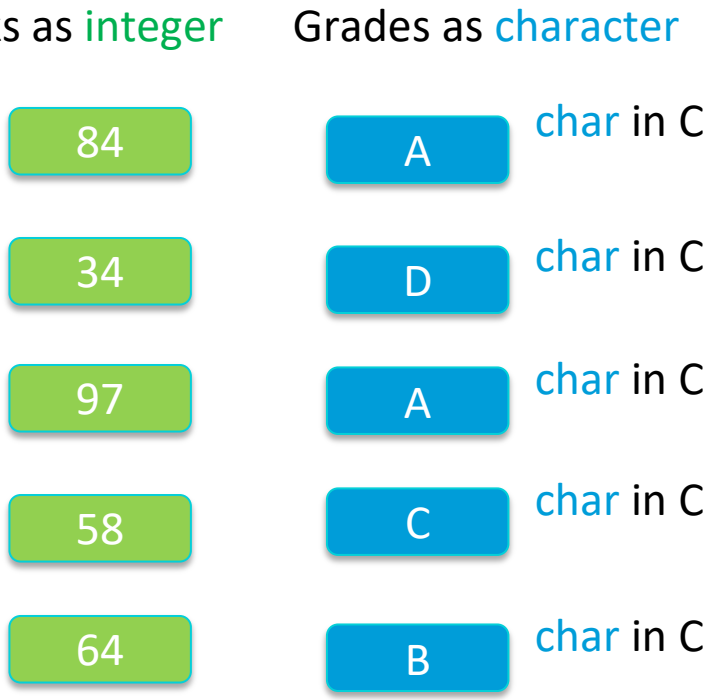
M1=84, G1=?

M2=34, G2=?

M3=97, G3=?

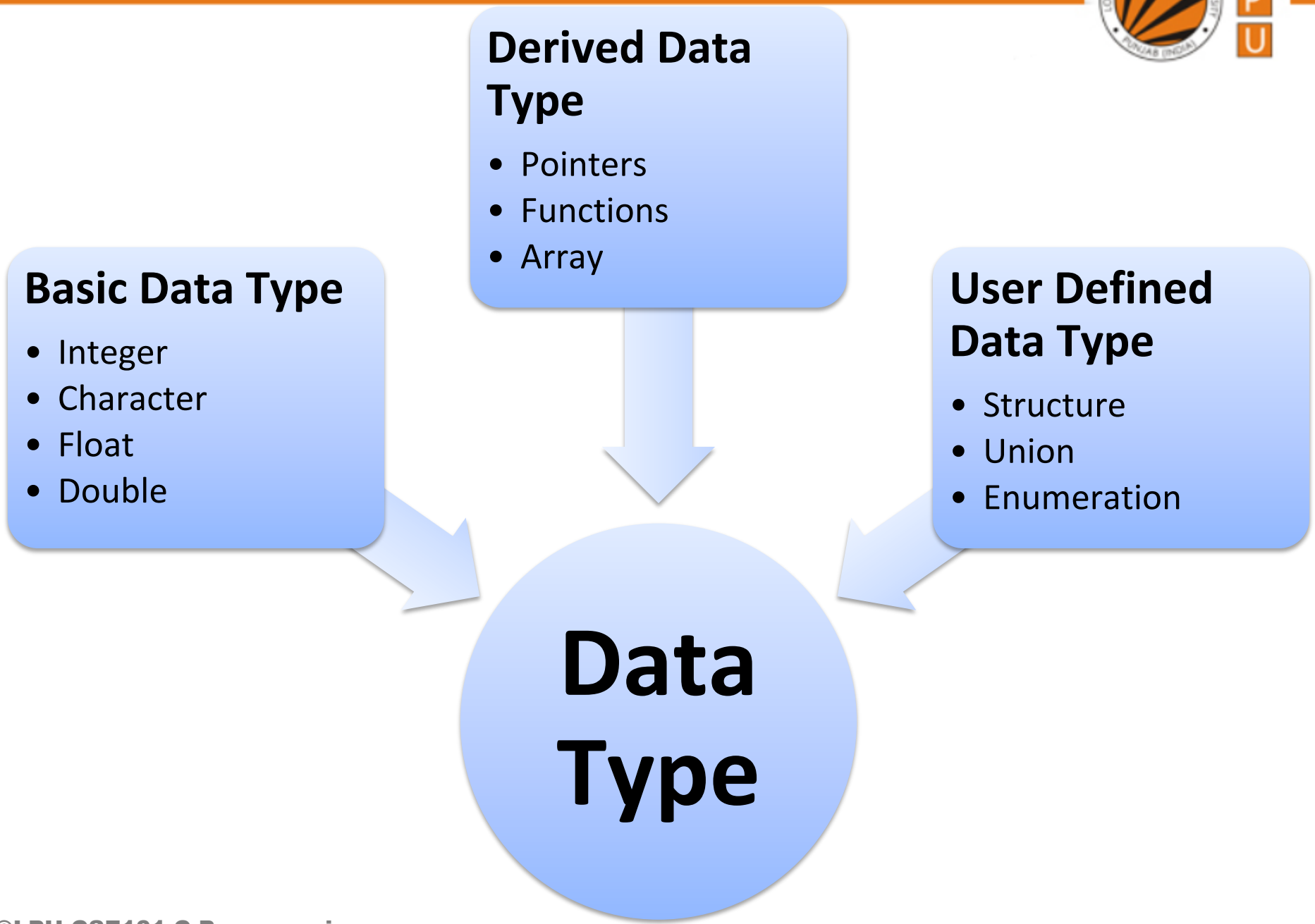
M4=58, G4=?

M5=64, G5=?



Classification of Data Types

- In C data type is broadly classified as:
  - Basic data types
  - Derived data types
  - User defined data types


Derived Data Type
• Pointers
• Functions
• Array
Basic Data Type
• Integer
• Character
• Float
• Double
User Defined Data Type
• Structure
• Union
• Enumeration
Data Type

List of Data Types

(Size of the data type depends upon the compiler also, following sizes may vary also, as per different compilers)

Type	Size (bytes)	Minimal range
char	1	-128 to 127
unsigned char	1	0 to 255
int	2 or 4	-32768 to 32767
unsigned int	2 or 4	0 to 65535
short int	2	-32768 to 32767
unsigned short int	2	0 to 65535
long int	4	-2147483648 to 2147483647
unsigned long int	4	0 to 4294967295
float	4	3.4e-38 to 3.4e+38 with 6 digits of precision
double	8	1.7e-308 to 1.7e+308 with 15 digits of precision
long double	10 or 12 or 16	3.4e-4932 to 1.1e+4932 with 20 digits of precision

Integer

- It is used to store positive and negative counting numbers, as well as zero.

{...,-2,-1,0,1,2,...}

- The numbers written in green box of My-Car problem are the integers.

- The **type modifiers** for the integer data type are: signed, unsigned, short, long .
- Signed types represent positive and negative numbers.
- Unsigned represent zero and positive numbers only.
- Long and short represent the range of integer number

Short Integer

- Occupies 2 bytes in memory.
- Format specifier is %d or %i.
- Range is -32768 to 32767.
- By default int variable is short signed int.

```
int cost=100;
short int si;
```

Long Integer

- Occupies 4 bytes in memory.
- Format specifier is %ld.
- Range is -2147483648 to 2147483647

```
long radius=123456;
long int value;
```

Signed Integer

- Occupies 2 bytes in memory
- Format specifier is %d or %i
- There are also long signed integers having range from -2147483648 to 2147483647
- Example:

```
int firstvalue=10;
long int WaterLevel;
```

Unsigned Integer

- Occupies 2 bytes in memory
- Format specifier is %u.
- There are also long unsigned int with range 0 to 4294967295
- Example:

```
unsigned long count=567898;
unsigned short int page;
```

Float

- Floating point numbers are real numbers that, unlike integers, may contain fractional parts of numbers, like 1.446, -112.972, 3.267e+27.
- It is used to store real numbers with single precision i.e. a precision of 6 digits after decimal point.

- Format specifier is **%f.**
- The **type modifier** for float are float, double and long double.

- The rational number written in red box of My-Car problem are the float numbers.

3.14 94.2

Type	Float	Double	Long double
Storage Size	4 bytes	8 bytes	10 bytes/or 16 bytes
Value range	3.4e-38 to 3.4e+38	1.7e-308 to 1.7e+308	3.4e-4932 to 1.1e+4932
Precision	6 decimal places	15 decimal places	20 decimal places
Example	pi=3.141592	3.141592741012573	3.141592653589793238 46

Character

- It stores a single character of data belonging to the C character set.

- The alphabets written in blue box of My-Grades problem are the character.

A	D	A	B	C

- It occupies 1 byte of memory.
- Format specifier is **%c**.
- The range is 0 to 255 for unsigned char.
- The range is -128 to 127 for signed char.
- Each char type has an equivalent integer interpretation, ASCII value, so that a char is really a special kind of short integer.

char choice='y';

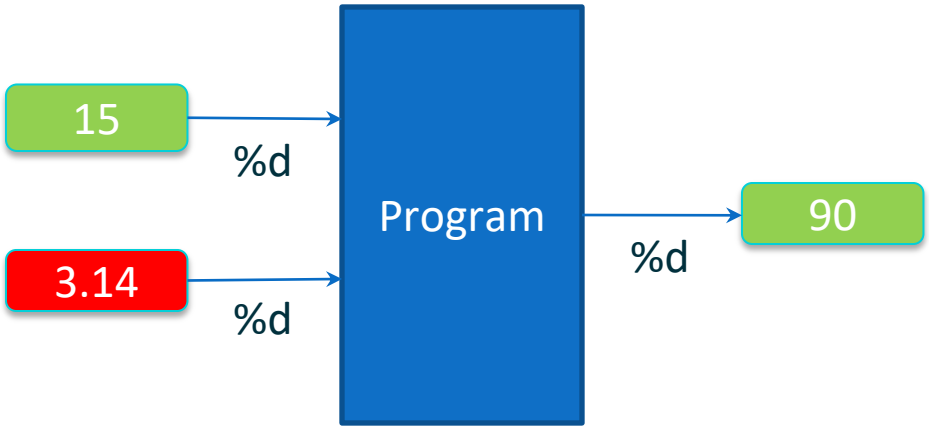
Format Specifier

- Specifies the format according to which the value will be printed on screen in C.

Example:

- %d or %i : signed integer
- %ld: long integer
- %u : unsigned integer
- %c : single character
- %f or %g : float
- %lf: double
- %Lf: long double
- %s : string

- Remember car example?



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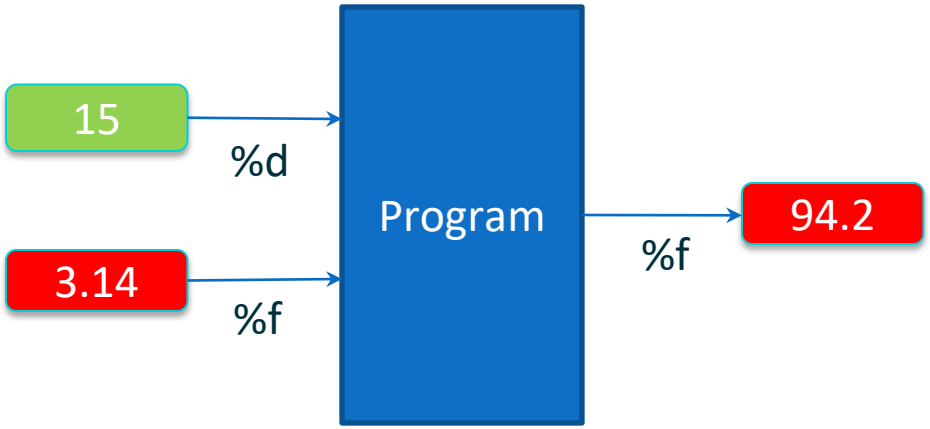

- Grade example:

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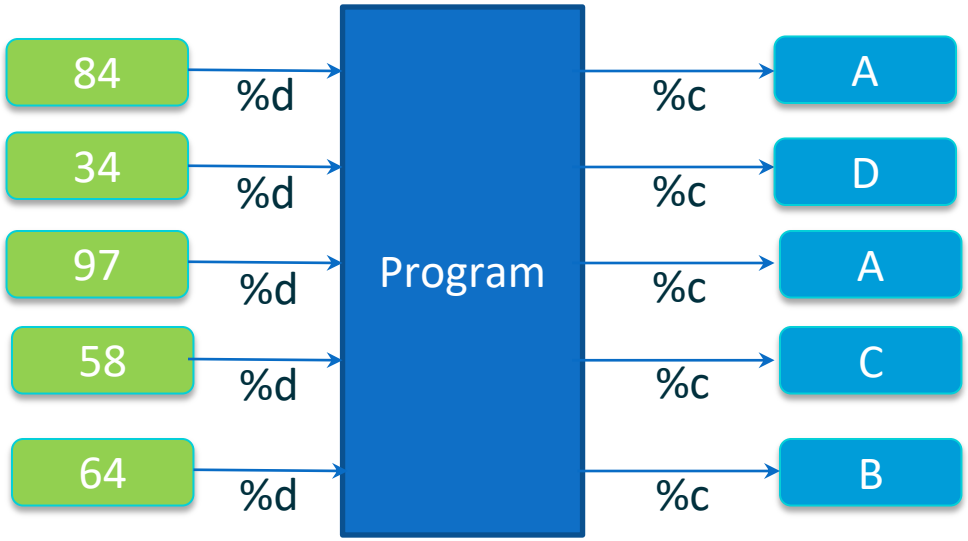

Q1

Which of the following is not a basic data type in C language?
a) float
b) int
c) real
d) char

Q2

The format identifier ‘%i’ is also used for _____ data type.
a) char
b) int
c) float
d) double

Q3

In a C program, following variables are defined:

float x = 2.17;

double y = 2.17;

long double z = 2.17;

Which of the following is correct way for printing these variables via printf.

A. printf("%f %lf %Lf",x,y,z);

B. printf(“%f %f %f”,x,y,z);

C. printf("%f %ff %fff",x,y,z);

D. printf("%f %lf %llf",x,y,z);

Q4

What will be the output of the following C code?

```
#include  <stdio.h>
int main()
{
   signed char chr;
   chr = 128;
   printf("%d\n", chr);
   return 0;
}
```

a) 128
b) -128
c) Depends on the compiler
d) None of the mentioned

Q5

Which is correct with respect to the size of the data types?

a) char > int > float

b) int > char > float

c) char < int < double

d) double > char > int

Next Lecture: Constants
Variables
Expressions